POLITECNICO DI MILANO

PhD in INGEGNERIA GESTIONALE / MANAGEMENT ENGINEERING - 37th cycle

Interdisciplinary Research Field: DRONES & LAST-MILE LOGISTICS: BUILDING RESILIENT AND SUSTAINABLE URBAN DISTRIBUTION THROUGH TECHNOLOGICAL INNOVATIONS

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Interdisciplinary PhD Grant The PhD research will be carried out in collaboration with research groups of the PhD programme in "**AEROSPACE ENGINEERING**". See http://www.dottorato.polimi.it/index.php?id=242&L=1 for further information. The overarching objective of the research project is to improve the resilience and sustainability of logistics-distribution systems in the urban context (also called last mile delivery from a company perspective) following disruptions through technological innovation, such as drones. In particular, this research aims to: (i) study the adoption of technology innovation in a logistics process as a response to disruptive events for a resilient and sustainable logistics system for urban distribution; (ii) configure an end-to-end logistics service and design the logistics network and infrastructure through the adoption of autonomous vehicles (*e.g.*, drones) for the urban delivery; (iii) simulate and assess the economic, environmental and social impact of the end-to-end logistics service for urban delivery and connected resilience levels.The pandemic has generated a growing demand for local distribution services in the urban environment, due to changes in consumption styles and the increasing importance of the e-commerce channel. All this has put considerable pressure on traditional systems of urban delivery, sometimes compromising their

	efficiency and effectiveness, in terms of service offered to the consumer and the impact on the society. Therefore, the project aims to provide an innovative, resilient and sustainable solution to respond to these changes that seem to have become structural and permanent and, at the same time, to ensure continuity of distribution in a sustainable way in the event of crises such as those experienced recently.
Methods and techniques that will be developed and used to carry out the research	The initial stages of the research will be grounded on the study and the development of innovation and dynamic capabilities that will span from the distinctive capabilities of logistics service providers to the technological capabilities of unmanned vehicles. This allows identifying drivers and barriers to the adoption of innovative solutions according to an interdisciplinary approach. The research will also be based on analytical modelling and simulation of the logistics processes, driven by the logistics needs that have to be fulfilled and the features of the technologies available to respond to those needs. The match of features and needs will be investigated through application cases that will combine the two disciplinary areas, *i.e.*, logistics management and aerospace engineering. Along the same interdisciplinary lines, the sustainability of the proposed end-to-end logistics service will be assessed through Life Cycle Assessment techniques that will encompass the logistics process and the life cycle of the vehicles. The resilience of the logistics service will be assessed through risk mapping and evaluation techniques of the distribution network and risk assessment of the Ground Risk Class and Air Risk Class moving from the definition of the Concept of Operations for Drones (ConOps).
Educational objectives	The Ph.D. candidate at the end of the program should: possess adequate research skills in the field of logistics and supply chain management; be able to analyze dataset using statistical and network analysis tools; be able to model logistics systems and critically interpret and comment the outcomes of the analysis.
Job opportunities	Academia, international institutions, logistics companies,

	multinational organizations, consulting firms.
Composition of the research group	2 Full Professors 4 Associated Professors 2 Assistant Professors 5 PhD Students
Name of the research directors	Claudia Colicchia, Marco Lovera

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	566.36 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Candidates with a background in Logistics or Management Engineering or Mobility Engineering or Mathematical Engineering, and quantitative skills are encouraged to apply.
The candidate might be involved as research associate in additional research projects and as teaching assistant in courses of Logistics and Supply Chain Management.

Funding for educational activities: 1st year: 1200 euros per student, 2nd year: 1200 euros per student, 3rd year: 1200 euros per student.
Teaching assistantship: There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.
Desk availability: shared use
Computer availability: individual use